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## RAW SEQUENCE LISTING

DATE: 07/09/2002

PATENT APPLICATION: US/10/043,418

TIME: 13:32:20

Input Set : A:\Uw974861.app

Output Set: N:\CRF3\07092002\J043418.raw

ENTERED

3 <110> APPLICANT: Henson, Cynthia A.  
 4 Muslin, Elizabeth H.  
 5 Clark, Suzanne E.  
 7 <120> TITLE OF INVENTION: Modified barley alpha-glucosidase  
 9 <130> FILE REFERENCE: 960296.97486  
 11 <140> CURRENT APPLICATION NUMBER: 10/043,418  
 C--> 12 <141> CURRENT FILING DATE: 2002-06-25  
 14 <150> PRIOR APPLICATION NUMBER: 60/260,787  
 15 <151> PRIOR FILING DATE: 2001-01-10  
 17 <160> NUMBER OF SEQ ID NOS: 7  
 19 <170> SOFTWARE: PatentIn Ver. 2.1  
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 22 <211> LENGTH: 877  
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 33 Thr Val Leu Ala Val Ala Val Thr Met Glu Gly Ala Leu Arg Ala Glu  
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 37 50 55 60  
 39 Val Tyr Ala Ser Leu Glu Thr Asp Ser Arg Leu Arg Val Arg Ile Thr  
 40 65 70 75 80  
 42 Asp Ala Asp His Pro Arg Trp Glu Val Pro Gln Asp Ile Ile Pro Arg  
 43 85 90 95  
 45 Pro Ala Pro Gly Asp Val Leu His Asp Ala Pro Pro Ala Ser Ser Ala  
 46 100 105 110  
 48 Pro Leu Gln Gly Arg Val Leu Ser Pro Ala Gly Ser Asp Leu Val Leu  
 49 115 120 125  
 51 Thr Val His Ala Ser Pro Phe Arg Phe Thr Val Ser Arg Arg Ser Thr  
 52 130 135 140  
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 55 145 150 155 160  
 57 Tyr Leu Glu Val Thr Ser Ala Leu Pro Ala Gly Arg Ala Ser Leu Tyr  
 58 165 170 175  
 60 Gly Leu Gly Glu His Thr Lys Ser Ser Phe Arg Leu Arg His Asn Asp  
 61 180 185 190  
 63 Ser Phe Thr Leu Trp Asn Ala Asp Ile Gly Ala Ser Tyr Val Asp Val  
 64 195 200 205  
 66 Asn Leu Tyr Gly Ser His Pro Phe Tyr Met Asp Val Arg Ala Pro Gly

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67      210      215      220
69 Thr Ala His Gly Val Leu Leu Leu Ser Ser Asn Gly Met Asp Val Leu
70 225      230      235      240
72 Tyr Gly Gly Ser Tyr Val Thr Tyr Lys Val Ile Gly Gly Val Leu Asp
73      245      250      255
75 Phe Tyr Phe Phe Ala Gly Pro Asn Pro Leu Ala Val Val Asp Gln Tyr
76      260      265      270
78 Thr Gln Leu Ile Ala Arg Pro Ala Pro Met Pro Tyr Trp Ser Phe Gly
79      275      280      285
81 Phe His Gln Cys Arg Tyr Gly Tyr Leu Asn Val Ser Asp Leu Glu Arg
82      290      295      300
84 Val Val Ala Arg Tyr Ala Lys Ala Arg Ile Pro Leu Glu Val Met Trp
85 305      310      315      320
87 Thr Asp Ile Asp Tyr Met Asp Gly Phe Lys Asp Phe Thr Leu Asp Arg
88      325      330      335
90 Val Asn Phe Thr Ala Ala Glu Leu Arg Pro Phe Val Asp Arg Leu His
91      340      345      350
93 Arg Asn Ala Gln Lys Tyr Val Leu Ile Leu Asp Pro Gly Ile Arg Val
94      355      360      365
96 Asp Pro Ile Asp Ala Thr Tyr Gly Thr Phe Val Arg Gly Met Gln Gln
97      370      375      380
99 Asp Ile Phe Leu Lys Arg Asn Gly Thr Asn Phe Val Gly Asn Val Trp
100 385      390      395      400
102 Pro Gly Asp Val Tyr Phe Pro Asp Phe Met His Pro Ala Ala Ala Glu
103      405      410      415
105 Phe Trp Ala Arg Glu Ile Ser Leu Phe Arg Arg Thr Ile Pro Val Asp
106      420      425      430
108 Gly Leu Trp Ile Asp Met Asn Glu Ile Ser Asn Phe Tyr Asn Pro Glu
109      435      440      445
111 Pro Met Asn Ala Leu Asp Asp Pro Pro Tyr Arg Ile Asn Asn Asp Gly
112      450      455      460
114 Thr Gly Arg Pro Ile Asn Asn Lys Thr Val Arg Pro Leu Ala Val His
115 465      470      475      480
117 Tyr Gly Gly Val Thr Glu Tyr Glu Glu His Asn Leu Phe Gly Leu Leu
118      485      490      495
120 Glu Ala Arg Ala Thr Gly Arg Gly Val Leu Arg Asp Thr Gly Arg Arg
121      500      505      510
123 Pro Phe Val Leu Ser Arg Ser Thr Phe Val Gly Ser Gly Arg Tyr Thr
124      515      520      525
126 Ala Tyr Trp Thr Gly Asp Asn Ala Ala Thr Trp Gly Asp Leu Arg Tyr
127      530      535      540
129 Ser Ile Asn Thr Met Leu Ser Phe Gly Leu Phe Gly Met Pro Met Ile
130 545      550      555      560
132 Gly Ala Asp Ile Cys Gly Phe Asn Gly Asn Thr Thr Glu Glu Leu Cys
133      565      570      575
135 Gly Arg Trp Ile Gln Leu Gly Ala Phe Tyr Pro Phe Ser Arg Asp His
136      580      585      590
138 Ser Ala Ile Phe Thr Val Arg Arg Glu Leu Tyr Leu Trp Pro Ser Val
139      595      600      605

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144 Tyr Phe Tyr Thr Leu Met Tyr Glu Ala His Met Thr Gly Ala Pro Ile
145 625                      630                      635                      640
147 Ala Arg Pro Leu Phe Phe Ser Tyr Pro His Asp Val Ala Thr Tyr Gly
148      645                      650                      655
150 Val Asp Arg Gln Phe Leu Leu Gly Arg Gly Val Leu Val Ser Pro Val
151      660                      665                      670
153 Leu Glu Pro Gly Pro Thr Thr Val Asp Ala Tyr Phe Pro Ala Gly Arg
154      675                      680                      685
156 Trp Tyr Arg Leu Tyr Asp Tyr Ser Leu Ala Val Ala Thr Arg Thr Gly
157      690                      695                      700
159 Lys His Val Arg Leu Pro Ala Pro Ala Asp Thr Val Asn Val His Leu
160 705                      710                      715                      720
162 Thr Gly Gly Thr Ile Leu Pro Leu Gln Gln Ser Ala Leu Thr Thr Ser
163      725                      730                      735
165 Arg Ala Arg Arg Thr Ala Phe His Leu Leu Val Ala Leu Ala Glu Asp
166      740                      745                      750
168 Gly Thr Ala Ser Gly Tyr Leu Phe Leu Asp Asp Gly Asp Ser Pro Glu
169      755                      760                      765
171 Tyr Gly Arg Arg Ser Asp Trp Ser Met Val Arg Phe Asn Tyr Lys Ile
172      770                      775                      780
174 Pro Asn Asn Lys Gly Ala Ile Lys Val Lys Ser Glu Val Val His Asn
175 785                      790                      795                      800
177 Ser Tyr Ala Gln Ser Arg Thr Leu Val Ile Ser Lys Val Val Leu Met
178      805                      810                      815
180 Gly His Arg Ser Pro Ala Ala Pro Lys Lys Leu Thr Val His Val Asn
181      820                      825                      830
183 Ser Ala Glu Val Glu Ala Ser Ser Ser Ala Gly Thr Arg Tyr Gln Asn
184      835                      840                      845
186 Ala Gly Gly Leu Gly Gly Val Ala His Ile Gly Gly Leu Ser Leu Val
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189 Val Gly Glu Glu Phe Glu Leu Lys Val Ala Met Ser Tyr
190 865                      870                      875
193 <210> SEQ ID NO: 2
194 <211> LENGTH: 914
195 <212> TYPE: PRT
196 <213> ORGANISM: Sugar beet
198 <400> SEQUENCE: 2
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202 Val Leu Pro Leu Val Leu Cys Met Val Val Glu Gly Ala Thr Thr Ser
203      20                      25                      30
205 Lys Asn Asp Asn Gln Gly Glu Ala Ile Gly Tyr Gly Tyr Gln Val Lys
206      35                      40                      45
208 Asn Ala Lys Val Asp Asn Ser Thr Gly Lys Ser Leu Thr Ala Leu Leu
209      50                      55                      60
211 Gln Leu Ile Arg Asn Ser Pro Val Tyr Gly Pro Asp Ile His Phe Leu
212 65                      70                      75                      80

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214 Ser Phe Thr Ala Ser Phe Glu Glu Asp Asp Thr Leu Arg Ile Arg Phe
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217 Thr Asp Ala Asn Asn Arg Arg Trp Glu Ile Pro Asn Glu Val Leu Pro
218                      100                      105                      110
220 Arg Pro Pro Pro Pro Pro Ser Pro Pro Pro Leu Ser Ser Leu Gln His
221                      115                      120                      125
223 Leu Pro Lys Pro Ile Pro Gln Asn Gln Pro Thr Thr Thr Val Leu Ser
224                      130                      135                      140
226 His Pro His Ser Asp Leu Ala Phe Thr Leu Phe His Thr Thr Pro Phe
227 145                      150                      155                      160
229 Gly Phe Thr Ile Tyr Arg Lys Ser Thr His Asp Val Leu Phe Asp Ala
230                      165                      170                      175
232 Thr Pro Ile Pro Ser Asn Pro Thr Thr Phe Leu Ile Tyr Lys Asp Gln
233                      180                      185                      190
235 Tyr Leu Gln Leu Ser Ser Ser Leu Pro Ala Gln Gln Ala His Leu Tyr
236                      195                      200                      205
238 Gly Leu Gly Glu His Thr Lys Pro Thr Phe Gln Leu Ala His Asn Gln
239                      210                      215                      220
241 Ile Leu Thr Leu Trp Asn Ala Asp Ile Ala Ser Phe Asn Arg Asp Leu
242 225                      230                      235                      240
244 Asn Leu Tyr Gly Ser His Pro Phe Tyr Met Asp Val Arg Ser Ser Pro
245                      245                      250                      255
247 Met Val Gly Ser Thr His Gly Val Phe Leu Leu Asn Ser Asn Gly Met
248                      260                      265                      270
250 Asp Val Glu Tyr Thr Gly Asp Arg Ile Thr Tyr Lys Val Ile Gly Gly
251                      275                      280                      285
253 Ile Ile Asp Leu Tyr Ile Phe Ala Gly Arg Thr Pro Glu Met Val Leu
254                      290                      295                      300
256 Asp Gln Tyr Thr Lys Leu Ile Gly Arg Pro Ala Pro Met Pro Tyr Trp
257 305                      310                      315                      320
259 Ala Phe Gly Phe His Gln Cys Arg Trp Gly Tyr Arg Asp Val Asn Glu
260                      325                      330                      335
262 Ile Glu Thr Val Val Asp Lys Tyr Ala Glu Ala Arg Ile Pro Leu Glu
263                      340                      345                      350
265 Val Met Trp Thr Asp Ile Asp Tyr Met Asp Ala Phe Lys Asp Phe Thr
266                      355                      360                      365
268 Leu Asp Pro Val His Phe Pro Leu Asp Lys Met Gln Gln Phe Val Thr
269                      370                      375                      380
271 Lys Leu His Arg Asn Gly Gln Arg Tyr Val Pro Ile Leu Asp Pro Gly
272 385                      390                      395                      400
274 Ile Asn Thr Asn Lys Ser Tyr Gly Thr Phe Ile Arg Gly Met Gln Ser
275                      405                      410                      415
277 Asn Val Phe Ile Lys Arg Asn Gly Asn Pro Tyr Leu Gly Ser Val Trp
278                      420                      425                      430
280 Pro Gly Pro Val Tyr Tyr Pro Asp Phe Leu Asp Pro Ala Ala Arg Ser
281                      435                      440                      445
283 Phe Trp Val Asp Glu Ile Lys Arg Phe Arg Asp Ile Leu Pro Ile Asp
284                      450                      455                      460
286 Gly Ile Trp Ile Asp Met Asn Glu Ala Ser Asn Phe Ile Thr Ser Ala

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287 465          470          475          480
289 Pro Thr Pro Gly Ser Thr Leu Asp Asn Pro Pro Tyr Lys Ile Asn Asn
290          485          490          495
292 Ser Gly Gly Arg Val Pro Ile Asn Ser Lys Thr Ile Pro Ala Thr Ala
293          500          505          510
295 Met His Tyr Gly Asn Val Thr Glu Tyr Asn Ala His Asn Leu Tyr Gly
296          515          520          525
298 Phe Leu Glu Ser Gln Ala Thr Arg Glu Ala Leu Val Arg Pro Ala Thr
299          530          535          540
301 Arg Gly Pro Phe Leu Leu Ser Arg Ser Thr Phe Ala Gly Ser Gly Lys
302 545          550          555          560
304 Tyr Thr Ala His Trp Thr Gly Asp Asn Ala Ala Arg Trp Asp Asp Leu
305          565          570          575
307 Gln Tyr Ser Ile Pro Thr Met Leu Asn Phe Gly Leu Phe Gly Met Pro
308          580          585          590
310 Met Ile Gly Ala Asp Ile Cys Gly Phe Ala Glu Ser Thr Thr Glu Glu
311          595          600          605
313 Leu Cys Cys Arg Trp Ile Gln Leu Gly Ala Phe Tyr Pro Phe Ser Arg
314          610          615          620
316 Asp His Ser Ala Arg Asp Thr Thr His Gln Glu Leu Tyr Leu Trp Glu
317 625          630          635          640
319 Ser Val Ala Ala Ser Ala Arg Thr Val Leu Gly Leu Arg Tyr Glu Leu
320          645          650          655
322 Leu Pro Tyr Tyr Tyr Thr Leu Met Tyr Asp Ala Asn Leu Arg Gly Ser
323          660          665          670
325 Pro Ile Ala Arg Pro Leu Ser Phe Thr Phe Pro Asp Asp Val Ala Thr
326          675          680          685
328 Tyr Gly Ile Ser Ser Gln Phe Leu Ile Gly Arg Gly Ile Met Val Ser
329          690          695          700
331 Pro Val Leu Gln Pro Gly Ser Ser Ile Val Asn Ala Tyr Ser Pro Arg
332 705          710          715          720
334 Gly Asn Trp Val Ser Leu Ser Asn Tyr Thr Ser Ser Val Ser Val Ser
335          725          730          735
337 Ala Gly Thr Tyr Val Ser Leu Ser Ala Pro Pro Asp His Ile Asn Val
338          740          745          750
340 His Ile His Glu Gly Asn Ile Val Ala Met Gln Gly Glu Ala Met Thr
341          755          760          765
343 Thr Gln Ala Ala Arg Ser Thr Pro Phe His Leu Leu Val Val Met Ser
344          770          775          780
346 Asp His Val Ala Ser Thr Gly Glu Leu Phe Leu Asp Asn Gly Ile Glu
347 785          790          795          800
349 Met Asp Ile Gly Gly Pro Gly Gly Lys Trp Thr Leu Val Arg Phe Phe
350          805          810          815
352 Ala Glu Ser Gly Ile Asn Asn Leu Thr Ile Ser Ser Glu Val Val Asn
353          820          825          830
355 Arg Gly Tyr Ala Met Ser Gln Arg Trp Val Met Asp Lys Ile Thr Ile
356          835          840          845
358 Leu Gly Leu Lys Arg Arg Val Lys Ile Lys Glu Tyr Thr Val Gln Lys
359          850          855          860

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VERIFICATION SUMMARY

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